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EXAMINER	
MULLINS, BURTON S	
ART UNIT	**PAPER NUMBER**
2834	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	09/371,692	KALSI, SWARN S.	
	Examiner	Art Unit	
	BURTON MULLINS	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 3-4, 9, 12-16 and 21-22 rejected under 35 U.S.C. 103(a) as being unpatentable over Rabinowitz et al.(US 5,3251,002) in view of Gamble et al. (US 5,777,420). Rabinowitz discloses a superconducting electric motor (Fig.6) comprising: a rotor assembly (61,62, 63, 64) including at least one winding (62, 63; c.5:66-68 and c.6:1-3) which, in operation, generates a flux path within the rotor assembly (61, 62, 63, 64); a support member (61) that supports the at least one winding (62,63), and an induction structure, i.e. rotor, (61, 62, 63, 64) to support induction current for driving the motor in a steady-state induction mode (c.4:41-45;); the rotor assembly (61, 62, 63, 64) configured to operate in a synchronous mode of operation at temperatures in which the winding (62,63) exhibits superconducting characteristics (c.4:14-19), and in a steady-state induction mode of operation at temperatures in which the winding (62, 63) exhibits non-superconducting characteristics (c.6:60-64; c.9, 4-15 and 33-38).

Rabinowitz does not explicitly teach a "superconducting" winding. Nor does Rabinowitz teach that his support member (rotor) 61 is "laminated".

Regarding the first difference, Rabinowitz c.5:64-c.6:3 teaches that:

> The superconducting material can be in any of a variety of forms, including particulate, foil, bulk and thin film superconducting materials. Because it is in a non-wire form, instead of one of more windings of wire, the motor/generator can be implemented with substantially any superconducting material, including those that are too brittle to be easily and/or cost effectively formed as superconducting wires.

This disclosure implies that superconductive windings of wire were known in the art. That fact is supported by Appellant's own specification (specification, p.3:3-9 and p.9:6-13 referring to U.S. Patent 5,581,220) and was admitted to during the appeal hearing. It is further supported by Rabinowitz '291 which states that rotating superconducting field coils in rotors have been known since 1971 (Rabinowitz '291, c.1:43-55; see also c.1:56-c.2.45 which further discusses the prior art). Rabinowitz suggests the use of non-wire superconducting materials in order to expand the selection of superconducting materials. Therefore, when one of ordinary skill was selecting a less brittle superconducting material, one would have found it obvious to provide a superconducting winding as claimed as such was a well known configuration. See the Board's opinion p.4:13-p.6:5.

Regarding the second difference of a "laminated" support, Gamble teaches a superconductor motor including a rotor with superconducting windings 30 and an iron core 50 comprising stacked laminations 52 (Figs.1-2&5). Laminations are preferred over solid iron cores because in the event that one of the laminations cracks, the crack is isolated to that lamination and will not propagate to neighboring laminations and through the core (c.2:18-22 & c.4:43-55).

It would therefore have been obvious to modify Rabinowitz and provide a laminated rotor core per Gamble to prevent cracks from propagating through the core.

Regarding claim 3, Rabinowitz teaches that the rotor assembly (61, 62, 63, 64) includes induction structure configured to allow the superconducting motor to generate a starting torque which is at least 50% of the rated torque in the induction mode of operation (c.9:4-32).

Regarding claim 4, Rabinowitz teaches that the rotor assembly (61, 62, 63, 64) includes induction structure configured to allow the superconducting motor to generate a peak torque which is approximately twice the rated torque in the induction-mode of operation (c.9:4-32).

Regarding claim 9, Gamble's induction structure, i.e. rotor 50, comprises a laminated support member or core (Fig.5).

Regarding claims 12-13, Rabinowitz.discloses that the induction structure includes the support member (61) which supports the at least one superconducting winding (62,63) and futher teaches a stator assembly (60) electromagnetically coupled to the rotor assembly (61,62, 63, 64), and an adjustable speed drive providing an electrical signal to the stator assembly (60) (c.9:4-32), wherein the adjustable speed drive provides a signal at a first frequency to the stator (60) to start the superconducting motor in the synchronous mode of operation and provides a signal at a second frequency, less than the first frequency, to the stator (60) in the induction mode of operation (c.9:4-32).

Regarding claims 14 and 16, Rabinowitz discloses that the superconducting winding (62,63) includes a high temperature superconductor (see Table 2) and that the support member (61) is formed of aluminum. Gamble also teaches a high-temperature superconductive conductor for windings 30 (c.3:61-66).

Regarding claim 15, Gamble teaches a race-track superconducting winding (Fig.4; c.3:58-61).

Regarding claim 21, Rabinowitz discloses a method of operating a superconducting electric motor of the type including a rotor assembly (61, 62, 63, 64) including at least one superconducting winding (62,63) which, in operation, generates a flux within the rotor assembly

(61,62, 63, 64), and a support member (61)which supports the at least one superconducting winding (62,63). Rabinowitz discloses that the method comprises: monitoring the temperature of the superconducting winding (62,63), operating the superconducting motor in a synchronous mode at a temperature wherein the superconducting winding exhibits superconducting characteristics, and operating the superconducting motor in an induction mode at a temperature wherein the superconducting winding exhibits non-superconducting characteristics(c.9:4-32).

Regarding claim 22, Rabinowitz discloses that operating the superconducting motor in the synchronous mode includes providing an electrical signal to a stator assembly (60), electromagnetically coupled to the rotor assembly (61, 62, 63, 64), the signal having a first frequency, and operating the superconducting motor in the induction mode including providing a signal to the stator assembly (60) at a second frequency less than the first frequency (c.9: 4-32).

3. Claims 5-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabinowitz et al. and Gamble et al. (US 5,777,420) as applied to claims 4 and 9 above, further in view of Rabinowitz (US 4,176,291). Rabinowitz et al. and Gamble substantially disclose applicant's superconducting electric motor as claimed in claims 4 & 9; however, neither Rabinowitz et al. nor Gamble disclose that at least a portion of the induction structure is spaced from the at least one superconducting winding by a thermal isolation vacuum region (claim 5) or an electromagnetic shield spaced from the superconducting winding by a thermal isolation vacuum region (claim 10).

Rabinowitz '291 discloses a superconducting synchronous machine including a rotor or induction structure 6 (Fig.2) which includes a portion (18) spaced from the at least one superconducting winding (44) by a thermal isolation vacuum region (19) (Fig.2) which includes

an electromagnetic shield member (18) (Fig.2). This structure screens the superconducting winding from non-synchronous components of the magnetic fields produced by unbalanced or transient currents in the armature winding and absorbs thermal radiation from the ambient temperature and re-radiates it at a lower temperature (c.4:20-31) .

It would have been obvious at the time the invention was made to modify the superconducting electric motor of Rabinowitz and Gamble and provide a thermal isolation vacuum region and electromagnetic shield member disclosed by Rabinowitz '291 for the purpose of screening the superconducting winding from non-synchronous components of the magnetic fields produced by unbalanced or transient currents in the armature winding and absorbing thermal radiation from the ambient temperature and re-radiating it at a lower temperature.

Regarding claim 6, the thermal isolation vacuum region (19) in Rabinowitz '291 includes an electromagnetic shield member (18) (Fig.2).

Regarding claim 7, Rabinowitz '291 further discloses a cryostat (58, 59, 60) positioned between the thermal isolation vacuum region (19) and the induction structure (18).

Regarding claim 8, Rabinowitz '291 discloses that the electromagnetic shield member (18) includes a conductive, non-magnetic material.

Regarding claim 11, the laminations in Gamble lie in a plane parallel to magnetic field flux lines extending through the laminations during operation of the superconducting electric motor (Figs.1-2&5).

4. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabinowitz et al.(US 5,325,002) in view of Gamble et al. (US 5,777,420) and Renard et al. (US 3,904,901). Rabinowitz discloses a superconducting electric motor (Fig.6) comprising: a rotor assembly

(61,62, 63, 64) including at least one winding (62, 63; c.5:66-68 and c.6:1-3) having a high-temperature superconductor (see Table 2) which, in operation, generates a flux path within the rotor assembly (61, 62, 63, 64); a support member (61) that supports the at least one winding (62,63), and an induction structure, i.e. rotor, (61, 62, 63, 64) to support induction current for driving the motor in a steady-state induction mode (c.4:41-45;); the rotor assembly (61, 62, 63, 64) configured to operate in a synchronous mode of operation at temperatures in which the winding (62,63) exhibits superconducting characteristics (c.4:14-19), and in a steady-state induction mode of operation at temperatures in which the winding (62, 63) exhibits non-superconducting characteristics (c.6:60-64; c.9, 4-15 and 33-38). Rabino

Rabinowitz does not explicitly teach: 1) a "superconducting" winding; 2) a "laminated" support; or 3) a cryostat surrounding the rotor assembly. Further, while Rabinowitz teaches an electromagnetic shield (torque-shield) 14/64 surrounding superconductor winding 13/62 (Figs.2&6), there is no teaching that the electromagnetic shield 14/64 surrounds the cryostat.

Regarding feature (1), as set forth above in the rejection of claim 1, Rabinowitz's disclosure implies that superconductive windings of wire were known in the art and therefore, when one of ordinary skill was selecting a less brittle superconducting material, one would have found it obvious to provide a superconducting winding as claimed as such was a well known configuration.

Regarding feature (2),Gamble teaches a superconductor motor including a rotor with superconducting windings 30 and an iron core 50 comprising stacked laminations 52 (Figs.1-2&5). Laminations are preferred over solid iron cores because in the event that one of the laminations cracks, the crack is isolated to that lamination and will not propagate to neighboring

laminations and through the core (c.2:18-22 & c.4:43-55). It would therefore have been obvious to modify Rabinowitz and provide a laminated rotor core per Gamble to prevent cracks from propagating through the core.

Regarding feature (3), Renard teaches a superconducting machine including a cryostat (119, 120) surrounding the rotor and superconductor winding 115 (Figs.9-10) for the purpose of maintaining the at least one superconducting winding 115 at cryogenic temperatures (c.10:27-30 & 48-54 & c.11:3-9). The outer wall 120 further comprises an electromagnetic shield which surrounds the cryostat and the superconductor windings 115 (c.10:32-36).

It would have been obvious at the time the invention was made to modify the superconducting electric motor of Rabinowitz and Gamble and provide it with a cryostat surrounding the rotor assembly and an electromagnetic shield surrounding the cryostat and the superconductor winding per Renard for the purpose of maintaining the superconducting winding at cryogenic temperatures.

Regarding claims 18-19, the machines of Rabinowitz, Gamble and Renard each include stator structures. Rabinowitz further discloses an adjustable speed drive providing an electrical signal to the stator assembly (60) (c.9:4-32), wherein the adjustable speed drive provides a signal at a first frequency to the stator (60) to start the superconducting motor in the synchronous mode of operation and provides a signal at a second frequency, less than the first frequency, to the stator (60) in the induction mode of operation (c.9:4-32).

Regarding claim 20, the laminations in Gamble lie in a plane parallel to magnetic field flux lines extending through the laminations during operation of the superconducting electric motor (Figs.1-2&5).

Response to Arguments

5. Applicant's arguments with respect to claim 1 have been considered but are not persuasive. Applicant argues that the secondary reference Gamble does not teach a laminated "support member" but instead teaches a core member 50 formed as a set of laminations (c.4:31-32). It is noted that claim 1 recites "a laminated support member that supports the superconducting winding". It is further noted that the base reference Rabinowitz et al.(US 5,3251,002) teaches a support member (61) that supports the at least one winding (62,63); however, Rabinowitz's support member is not "laminated". Gamble teaches a superconductor motor including a rotor with superconducting windings 30 and an iron core 50 comprising stacked laminations 52 (Figs.1-2&5). Laminations are preferred over solid iron cores because in the event that one of the laminations cracks, the crack is isolated to that lamination and will not propagate to neighboring laminations and through the core (c.2:18-22 & c.4:43-55). Thus, laminating Rabinowitz's support member 61 would have been obvious in view of Gamble's teaching that laminations isolate cracks. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Further, Gamble's core 50 comprises a "support member" for the superconductor windings 30 in the sense that it is integrated with or 'supports' the torque tube 20, which in turn is integrated with or 'supports' the windings 30 (Fig.2). Applicant attempts to distinguish the 'direct' support of the windings that his laminated support provides. However, this is

inconsistent with the definition of "support member" as described in applicant's specification p.7:16-21 and shown in Figs.1-2. With reference to Fig.1, the specification states that the "cold support member 20 is shown as an inner cylindrical member 20a surrounded by an outer cylindrical member 20b having an outer surface 22 with four stepped profiles 24". Both the inner cylindrical member 20a corresponding to a 'core' and the outer cylindrical member 20b corresponding to a 'direct support' of the windings 30 are explicitly described as comprising the "support member" even though the former does not 'directly' support the windings. Thus, using applicant's own definition of "support member", Gamble's laminated core 50 comprises a laminated "support member".

Conclusion

6. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BURTON MULLINS whose telephone number is (571)272-2029. The examiner can normally be reached on 9-5. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571)272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BURTON MULLINS/
Primary Examiner, Art Unit 2834

bsm
09 May 2008